A Three-Dimensional Non-Paraxial Beam Propagation Method using Complex Jacobi Iteration

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Abstract - A new complex Jacobi iterative technique adapted for the solution of three-dimensional (3D) non-paraxial beam propagation is presented. The effectiveness of our new approach is demonstrated in comparison with the traditional direct matrix inversion. Our method is targeted towards large waveguide structures with a long path length. The beam propagation equation for analysis of optical propagation in waveguide structures is based on a novel modified Pade(1,1) approximant operator, which gives evanescent waves the desired damping. The resulting approach allows more accurate approximations to the true Helmholtz equation than the standard Pade approximant operators.